

H11643

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

DESCRIPTIVE REPORT

Type of Survey Hydrographic Survey

Field No. N/A

Registry No. H11643

LOCALITY

State Alaska

General Locality Unimak Pass

Sublocality 5 Nautical Miles North of Akun Island

2007

CHIEF OF PARTY

Raj Bhangu

LIBRARY & ARCHIVES

DATE

NOAA FORM 77-28 (11-72) <p style="text-align: center;">U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION</p> <p style="text-align: center;">HYDROGRAPHIC TITLE SHEET</p>	REGISTRY No <p style="text-align: center;">H11643</p>
INSTRUCTIONS - The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.	FIELD No. N/A
<p>State <u>Alaska</u></p> <p>General Locality <u>Unimak Pass</u></p> <p>Sub-Locality <u>5 Nautical Miles North of Akun Island</u></p> <p>Scale <u>N/A</u> Date of Survey <u>June 3 – August 8, 2007</u></p> <p>Instructions dated <u>February 23, 2007</u> Project No. <u>OPR-P188-KR-07</u></p> <p>Vessel <u>R/V Kittiwake and Irish Ayes</u></p> <p>Chief of party <u>Raj Bhangu</u></p> <p>Surveyed by <u>TerraSond Ltd.</u></p> <p>Soundings by echo sounder, lead line, pole <u>Reson 8101 MBES</u></p> <p>Graphic record scaled by <u>N/A</u></p> <p>Graphic record checked by <u>N/A</u> Automated Plot <u>N/A</u></p> <p>Verification by <u>Sarah Wolfskehl</u> Evaluation By <u>Katie Reser</u></p> <p>Soundings in fathoms feet at MLW MLLW <u>Meters at MLLW</u></p>	
<p>REMARKS: <u>Contract No.: DG133C-05-CQ-1079 TerraSond Ltd., 1617 South Industrial Way, Ste 3, Palmer, AK 99645</u></p> <p><u>All times recorded in UTC. The purpose of this survey was to provide contemporary surveys to update National Ocean Service</u></p> <p><u>(NOS) nautical charts. All separates are filed with the hydrographic data. Revisions and end notes in red were generated</u></p> <p><u>during office processing. As a result, page numbering may be interrupted or non sequential.</u></p>	

Descriptive Report to Accompany Hydrographic Survey H11643

Sheet A

June 2nd, 2007 – August 8th, 2007

TerraSond Ltd.

Lead Hydrographer: Raj Bhangu

A. AREA SURVEYED

A navigable area survey was conducted in Unimak Pass, Alaska in accordance with the NOAA, National Ocean Service, Statement of Work, Shallow Water Multibeam Sonar and Side Scan Sonar Services, OPR-P188-KR-07, dated February 23, 2007¹.

The purpose of this project was to provide NOAA with modern, accurate hydrographic survey data with which to update the nautical charts of the assigned area. The project area was approximately 96 square nautical miles and was located 5 nautical miles north of Akun Island, Alaska, in the Bering Sea.

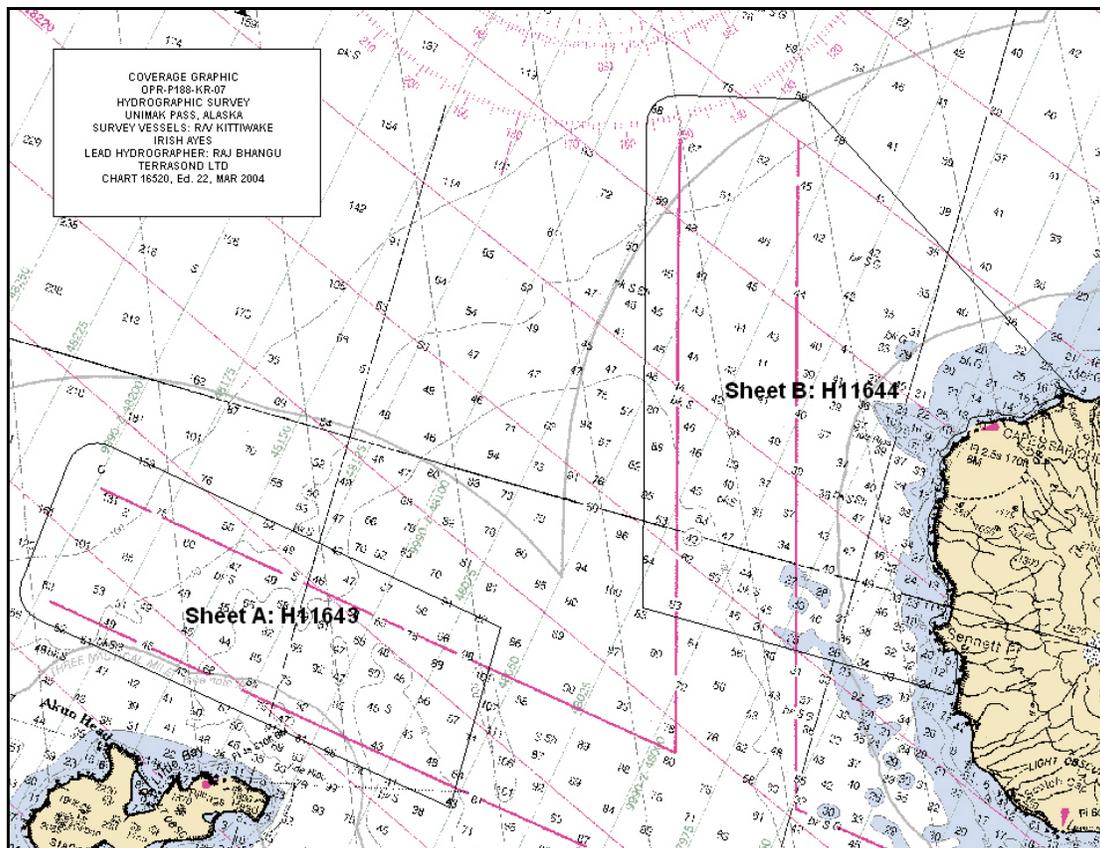


Figure 1 – Overview of H11643 and H11644 with Chart 16520, 22nd Edition, March 2004. Soundings in fathoms.

The project area includes a portion of the safety fairway through Unimak Pass which connects the Bering Sea with the North Pacific Ocean. Unimak Pass is a critical waterway for large shipping companies sailing from Asia to ports in Alaska and the west coast of the United States and Canada. Other traffic using the pass includes fishing vessels, scientific research vessels, and commercial intrastate shipping vessels supplying the Aleutian and Pribilof Islands as well as Alaska coastal communities from Bristol Bay to the Arctic Ocean.

Full bottom coverage, consisting of 100% shallow-water multibeam sonar, was achieved within the limits of hydrography for this survey. The multibeam data are used to locate and determine the least depth over obstructions and shoals as well as to determine the least depths over the entire project area. This survey has a maximum depth of 350 meters and a minimum depth of 70 meters below the Mean Lower Low Water (MLLW) tidal datum.

For complete survey limits, refer to Figure 1 on the preceding page.

B. DATA ACQUISITION AND PROCESSING

B.1. Equipment

Bathymetry for this survey was acquired using the hydrographic survey vessel *R/V Kittiwake*.

R/V Kittiwake

The *R/V Kittiwake* is a steel hull vessel, 30.3 meters length overall with a 7.9 meter beam and a 2.0 meter draft. Major systems used on the *R/V Kittiwake* are listed in Table 1.

VESSEL <i>R/V Kittiwake</i> LOA: 30.3m, BEAM 7.9m, DRAFT: 2.0m	
Equipment	Manufacturer & Model
Multibeam sonar	Reson SeaBat 8101
Positioning	Primary -- Seatex Seapath 200
Sound speed	Applied Microsystems SV Plus & SV Plus (V2)
Vessel attitude	Seatex MRU-5

Table 1 - Major systems used aboard the *R/V Kittiwake*.

Equipment performance details are provided in the Data Acquisition and Processing Report (DAPR)², Sections A. Equipment and B. Quality Control.

B.2. Quality Control

B.2.1. Shallow Water Multibeam

No conditions with the potential for adversely affecting data integrity were encountered with the multibeam suite used during this survey.

Multibeam confidence checks were conducted on the *R/V Kittiwake* to verify proper operation of the multibeam suite on a weekly basis, weather permitting. The confidence checks were performed by comparing nadir beam depths with lead line depths. The results of these comparisons and the line acquisition logs detailing aspects of quality control for each survey line are contained in “Separates I: Acquisition and Processing Logs” of this report.

A detailed discussion of multibeam system calibrations, patch tests, data acquisition, and processing is provided in the DAPR.

B.2.2. Crosslines

93 mainscheme lines totaling 569.0³ lineal nautical miles and 7 lines totaling 44.2 lineal nautical miles of crosslines were run during the 2007 survey of H11643. The ratio of the lineal nautical miles of crosslines to the lineal nautical miles of mainscheme lines, at 7.8%⁴, exceeds the 5% required by “NOAA Hydrographic Surveys Specifications and Deliverables”, Section 5.5.3. A total of 25 crossings were analyzed using CARIS HIPS & SIPS, in conjunction with Microsoft Excel, and comparisons were good. The crossings varied spatially and temporally. A comprehensive explanation of the crossline analysis process is in the DAPR. The reports generated from the crossline analysis are in “Separates IV: Crossline Comparisons.”

B.2.3. Contemporary Survey Junctions

There are no contemporary surveys junctions with which to compare this survey⁵. Survey H11644 was conducted concurrently with survey H11643 but the survey boundaries were not contiguous.

B.3. Corrections to Echo Soundings

Survey H11643 was performed in conjunction with one other survey in Project OPR-P188-KR-07. Any change to the corrections to echo soundings affects all surveys in the area and is described in detail in the DAPR.

Sounding data were reduced using zoning provided by NOAA/CO-OPS under the project instructions and final tides from the historic USC&GS tide station at Cape Sarichef, Unimak Island, AK (946-2787). Refer to the Horizontal and Vertical Control Report (HVCR)⁶ for tidal zoning methods and operations.

B.4. Data Processing

The final depth information for this survey was submitted as a collection of CARIS BASE surfaces which best represented the seafloor at the time of the 2007 survey. All possible measures were taken to ensure the data was correctly processed and the appropriate designated soundings, representing the least depth of significant contacts, were selected and retained in the finalized surfaces.

Several grids of varying resolution were created for H11643 due to the wide depth range and varying bathymetry found in the survey area. Grid spacing of 7, 8, 9, 12, 13 and 22 meters were used for the BASE surfaces and Digital Terrain Models (DTM).

Depth Range	BASE Surface Resolution
0 – 70 m	Not used
70 – 80 m	7 m
80 – 90 m	8 m
90 – 120 m	9 m
120 – 130 m	12 m
130 – 220 m	13 m
220 – 400 m	22 m

Table 2 - BASE surface resolution vs. survey depth.

24 digital products (3 for each variable BASE surface) were submitted for the 2007 survey. The nine variable BASE surfaces were combined to create a CARIS BASE uncertainty surface which covered the entire survey area in which the finalized uncertainty was the greater of the standard deviation and *a priori* uncertainty. A sun-illuminated DTM and an uncertainty DTM were created for each of the variable BASE surfaces and were submitted with the BASE surfaces. The naming conventions for each grid are:

CARIS BASE Uncertainty Surface: Sheet_A_0_40_2m.bms

- A represents the sheet (H11643)
- 0_40 represents the depth range
- 2m represents the resolution

Sun-Illuminated Elevation DTM: H11643_1_OF_9.tif

Uncertainty DTM: H11643_1_OF_9_Uncertainty.tif

The DAPR Sections A: Equipment – Data Collection; and B: Quality Control contain a detailed discussion of the steps followed when acquiring and processing the 2007 survey data.

C. VERTICAL AND HORIZONTAL CONTROL

Sounding data were tide adjusted using final tide levels for the historic USC&GS tide station at Cape Sarichef on Unimak Island, AK (946-2787) The final zoning methodology is described in detail in the project wide HVCR.

The horizontal control datum used for this survey is the North American Datum of 1983 (NAD 83). The projection used was UTM, Zone 3 North.

Sounding position control was determined using a Global Positioning System (GPS). The primary source of navigation correctors was the United States Coast Guard differential GPS (DGPS) station at Cold Bay, AK, StaID 296. Correctors from the USCG differential GPS station at Kodiak, AK, StaID 294, were used when the Cold Bay station was unavailable. A summary of weekly DGPS confidence checks is provided in Separates I: Acquisition and Processing Logs⁷.

D. RESULTS AND RECOMMENDATIONS

D.1. Chart Comparison

The chart comparison for H11643 was performed by examining the largest scale Electronic Navigation Chart (ENC)⁸ covering the survey area and comparing the charted depths with the surveyed depths in the same location. CARIS HIPS & SIPS was used to create six BASE surfaces with resolutions that varied as a function of water depth (Table 2). BASE surface resolutions were chosen, based on water depth, to provide the highest resolution supported by the data in accordance with NOS Hydrographic Surveys Specifications and Deliverables. The ENC soundings were viewed in CARIS HIPS & SIPS as a background layer with the BASE surfaces in the foreground. Each ENC depth was thoroughly compared with the BASE surface depth for the plotted location. Each ENC depth and the shoalest corresponding BASE surface depth was then transferred to Microsoft Excel for final analysis. MS Excel was used to compare depth offsets between the ENC and BASE surface. The offsets were recorded in meters, where the survey depth was deeper or shallower than the charted depth, and as a percentage of the total, surveyed, depth.

No Local Notice to Mariners (LNM) affected the survey area. LNM number 40 (Weekly Edition-October 2007) was the last notice reviewed for this project. No features or soundings were submitted as Dangers to Navigation (DTON) for the 2007 survey (Appendix I)⁹.

All survey data were compared to the data published in the Electronic Navigation Charts (ENC(s)) listed in Table 3.

Cell Name	Chart	Scale	Edition Number	Issue Date
US3AK61M	16520	1:300,000	3	03/26/2007
US4AK6FM	16531	1:80,000	4	06/15/2007

Table 3 - Electronic Navigation Charts used during chart comparisons.

There were no charted features in H11643 at the time of the survey. The 2007 survey generally agrees with the largest scale electronic navigational charts. Figure 2 shows the survey limits and the intersection between ENC US3AK61M, 3rd Edition and US4AK6FM, 4th Edition.

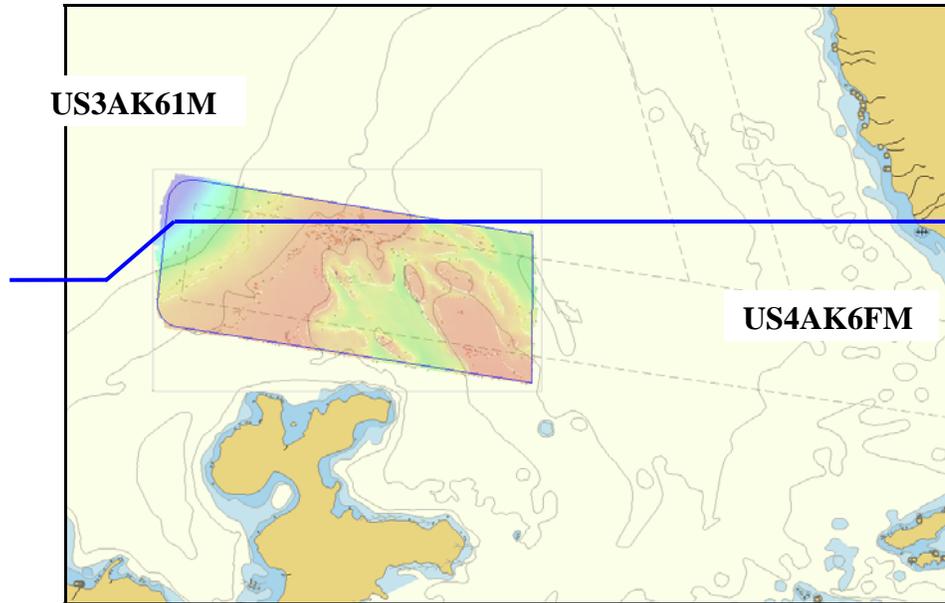


Figure 2 - Survey limits of H11643 shown with ENC US3AK61M, 3rd Edition and ENC US4AK6FM, 4th Edition.

The following pages detail discrepancies between the chart and the 2007 survey data. The hydrographer recommends that one uncharted feature be added to the charts of the area based on the 2007 survey data¹⁰.

D.1.1. New Features

The 2007 survey identified one feature, a sunken cargo vessel, which is not currently charted. A detailed description of this feature is contained in Figure 3, Figure 4 and Table 4. The hydrographer recommends updating the charts with data from the 2007 survey¹¹.

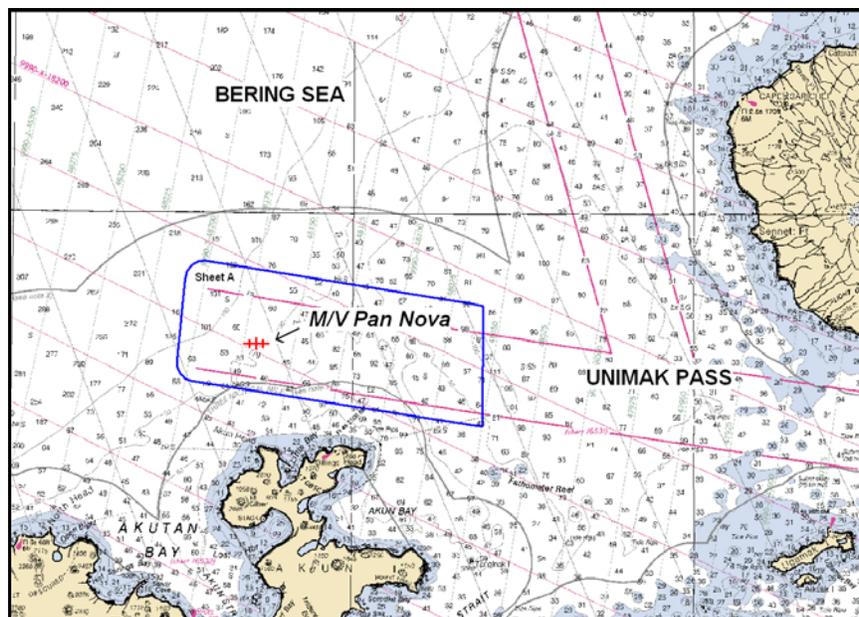


Figure 3 - Overview of Sheet A showing the location of the sunken freighter MV PAN NOVA (Chart 16520, 22nd Edition). Soundings in fathoms.

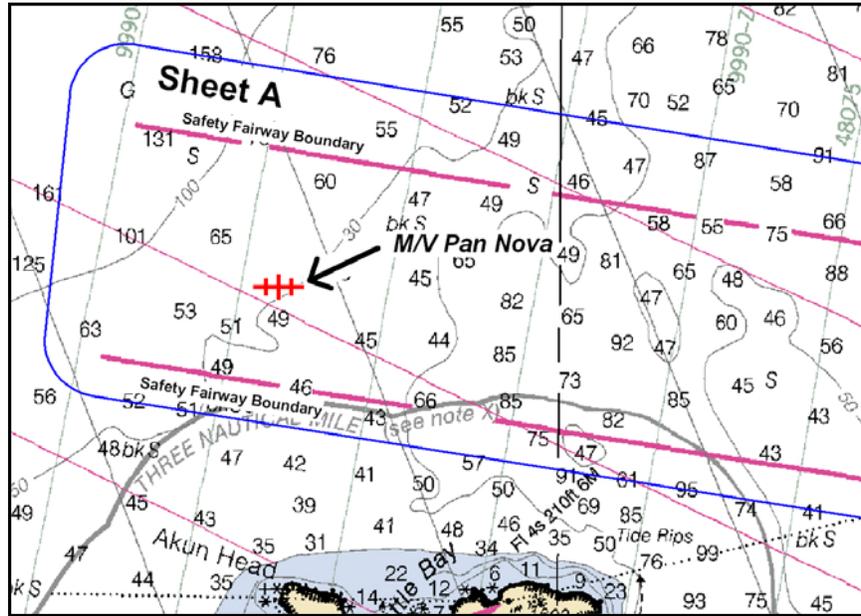


Figure 4 - Uncharted wreck identified by the 2007 survey located in H11643 within the boundaries of the marine safety fairway in Unimak Pass (Chart 16520, 22nd Edition). Soundings in fathoms.

Feature	Latitude (N)	Longitude (W)	Charted Depth (fn)	Sounding Depth (fn)	Difference (fn)
Wreck	54°22'45.54"N	165°38'24.23"W	49	40.8 ¹²	8.2

Table 4 - Detailed description of the uncharted wreck shown in Figure 3 and Figure 4.

A review of the Department of the Interior, Minerals Management Service, Alaska Outer Continental Shelf Region online database produced an entry suggesting that the wreck was the 551 foot *M/V Pan Nova*, a Korean freighter carrying a cargo of wheat, which sank 5 nautical miles north of Akun Island on September 10, 1983 following a collision with another Korean freighter in the Unimak Pass area.

Chart Number	Scale	Edition Number	Edition Date	Issued Date
16520	1:300,000	22	March 2004	March 2004
16531	1:80,000	7	2/16/02	2/16/02
ENC	Chart	Scale	Edition Number	Issue Date
US4AK6FM	16531	1:80,000	4	06/15/2007
US3AK61M	16520	1:300,000	3	03/26/2007
US1WC04M	500	1:3,500,000	5	03/26/2007

Table 5 - Nautical charts, raster and electronic, which require updating to include the uncharted wreck.

The surveyed least depth over the wreck, 245'¹³, did not warrant the generation of a Danger to Navigation (DTON) report although, due to a high level of local interest and at the request of the Contracting Officer's Technical Representative (COTR), an Uncharted Wreck Report, was submitted immediately following the discovery. A copy of this report is included in "Appendix V: Supplemental Survey Records and Correspondence".

The location of the wreck in the navigation safety fairway and the significant amount of relief above the charted bottom, 49', support a recommendation to include the wreck location on future editions of the charts of this area¹⁴. Although the wreck does not present a hazard to surface navigation, a significant amount of fishing, both deep water trawl and long-line bottom fishing, occurs in and around Unimak Pass.

D.1.2. Changed Features

There were no charted features in H11643 at the time of the survey¹⁵.

D.1.3. Disproved Features

There were no charted features in H11643 at the time of the survey¹⁶.

D.1.4. Soundings

Survey depths are in general agreement with the charted depths for the largest scale ENC¹⁷ covering H11643. There are 3 areas in which the 2007 survey soundings vary significantly from the charted soundings (Table 6, Figures 5 - 8). The hydrographer recommends updating the ENC to reflect the 2007 survey data.



Figure 5 - Overview of H11643 showing charted depth which is significantly shallower than the 2007 sounding data (US3AK61M, 3rd Edition). Letter adjacent to depth circled in red corresponds to data in Table 6. Soundings in meters.

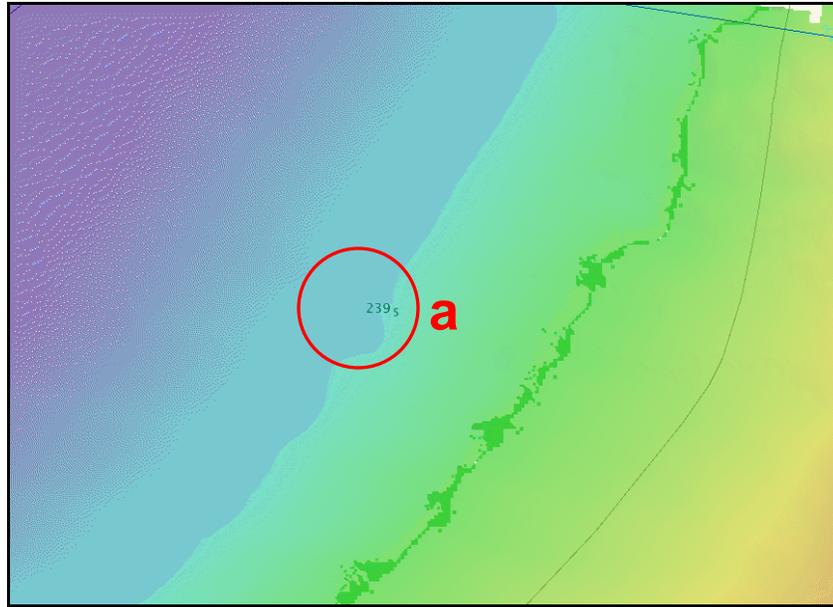


Figure 6 – Expanded view of H11643 showing charted 239.5 m depth superimposed on a CARIS Base Surface created from sounding data in the same vicinity. Soundings in meters.

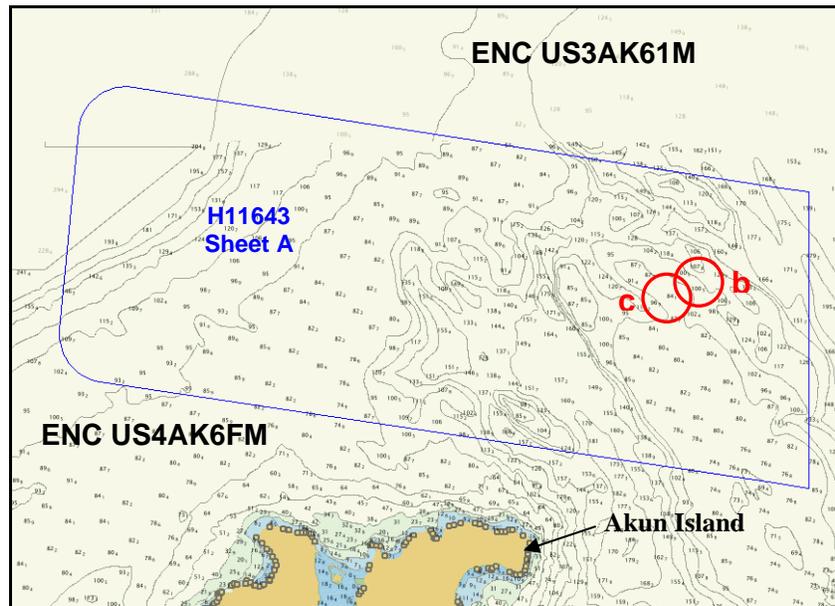


Figure 7- Overview of H11643 showing charted depths which are significantly shallower than the 2007 sounding data (US4AK6FM, 4th Edition). Letter adjacent to depth circled in red corresponds to data in Table 5. Soundings in meters

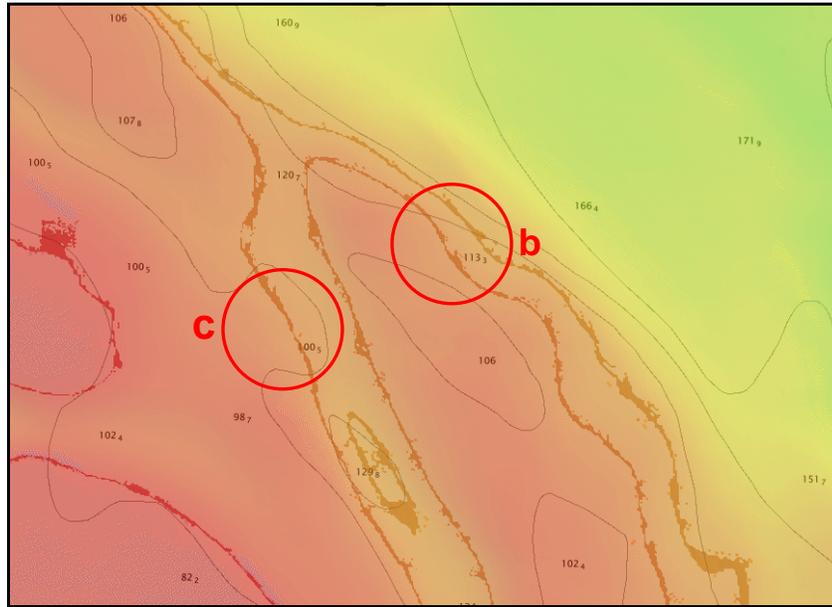


Figure 8 – Expanded view of H11643 showing charted 113.2 m and 100.5m depths, (b) and (c) respectively, superimposed on a CARIS Base Surface created from sounding data in the same vicinity. Soundings in meters

Feature Letter	ENC Sounding (m)	Survey Sounding (m)	Difference (m)	Latitude	Longitude	ENC
a	239.5	257.0	17.5	54° 25' 50.8"N	165° 42' 06.9"W	US35AK61M, 3 rd Edition;
b	113.3	125.4	12.1	54° 22' 50.5"N	165° 20' 41.9"W	US4AK6FM, 4 th Edition
c	100.5	121.3	20.8	54° 22' 33.4"N	165° 21' 37.4"W	US4AK6FM, 4 th Edition

Table 6 – 2007 survey soundings found significantly deeper than the corresponding charted soundings

The charted depths, as illustrated in Figure 6 and Figure 8, are significantly shallower than the depths determined as a result of the 2007 survey. Figure 6 and Figure 8 show the areas of the charted depths listed in Table 6. The uniform color gradient in these illustrations indicates a relatively uniform slope to the sea floor with a depth, at the charted sounding locations, that is deeper than is depicted on the chart. The sounding density during the survey conclusively disproves the shoal depths depicted on the chart and supports the recommendation to update ENC's US3AK61M and US4AK6FM with the data from the 2007 survey¹⁸.

D.1.5. Trends and Changeable Areas

Charted contours from ENC's US3AK61M and US4AK6FM were compared with the 2007 survey data using CARIS BASE Editor. The ENC contours were superimposed on a plot of the variable base surfaces (Figure 9) and compared with the general depth trends indicated by the false color enhanced image generated by the base surfaces. The charted contours and the 2007 survey data are in general agreement throughout the survey area. The hydrographer recommends that the charted contours be updated to reflect the 2007 survey data¹⁹.

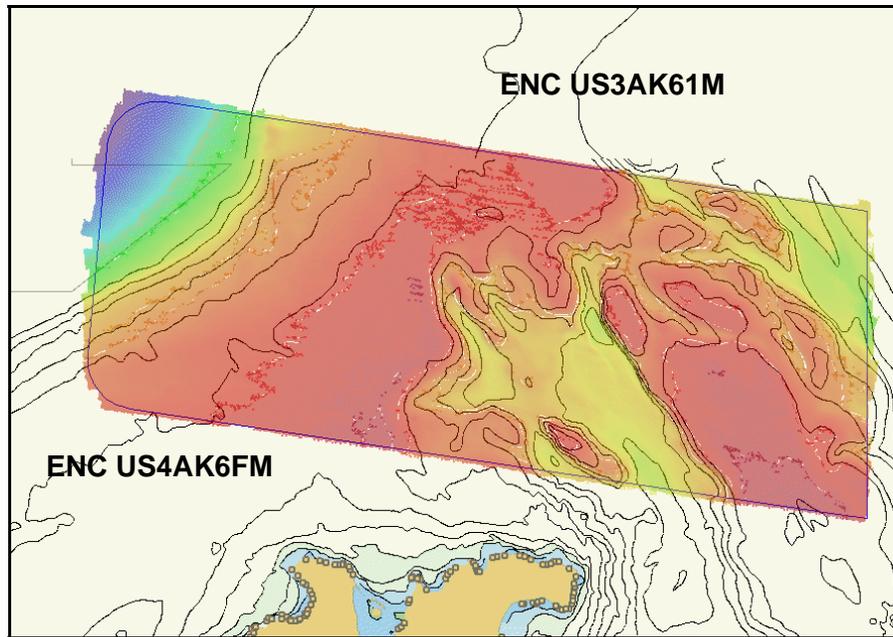


Figure 9 - Overview of H11643 showing CARIS variable base surfaces superimposed on ENC's US3AK61M and US4AK6FM. The depth gradient, indicated by the false color in the variable base surface, is in general agreement with the charted contours.

D.1.6. AWOIS Items Summary

Investigation of Automated Wreck and Obstruction Information System (AWOIS) items was not required under this task order²⁰.

D.2. Additional Results

D.2.1. Aids to Navigation

There were no floating aids to navigation located in this survey area²¹.

D.2.2. Drilling Structures

There are no drilling structures in this survey area²².

D.2.3. Comparison with Prior Surveys

A comparison with prior surveys was not required under this task order.

D.2.4. Bottom Samples

40 bottom samples were collected in support of the 2007 survey (Appendix V). The samples were distributed geographically to obtain a full representation of the bottom characteristics as specified in “NOAA Hydrographic Surveys Specifications and Deliverables”, Section 7.1²³.

D.2.5. Bridges and Overhead Cables

There are no bridges or overhead cables in the survey area²⁴.

D.2.6. Submarine Cables and Pipelines

There are no known submarine cables or pipelines in the survey area²⁵.

LETTER OF APPROVAL

REGISTRY NO. H11643

This report and the accompanying digital data are respectfully submitted.

Field operations contributing to the accomplishment of survey H11643 were conducted under my direct supervision with frequent personal checks of progress and adequacy. This report, digital data, and accompanying records have been closely reviewed and are considered complete and adequate as per the Statement of Work. Other reports submitted with this survey include the Data Acquisition and Processing Report and the Horizontal and Vertical Control Report.

I believe this survey is complete and adequate for its intended purpose.



Raj Bhangu, Hydrographer

TerraSond Ltd.

Date December 6, 2007

Revisions Compiled During Office Processing and Certification

¹ Concur

² Filed with project records

³ Concur with clarification: 96 main scheme lines totaling 549.5 linear nautical miles.

⁴ Concur with clarification. Crosslines make up 8.0% of total lineal nautical miles.

⁵ Concur

⁶ Filed with the project records

⁷ Filed with the project records

⁸ During office processing H11643 was compared with charts 16531, 1:80,000 (7th Ed., February 16, 2002, NM 8/03/08) and 16520, 1:300,000 (22nd Ed., March 1, 2004, NM 8/03/08). Charted soundings and surveyed soundings were found to be in general agreement with each other. Reviewer concurs with Section D.1.

⁹ Concur

¹⁰ Concur. See section D.1.1 New Features

¹¹ Concur

¹² Concur with clarification. Least depth on feature according to feature file is 40.6 fathoms

¹³ Concur with clarification. Least depth on feature according to feature file is 243.8 feet.

¹⁴ Concur. Recommend adding wreck to AWOIS database

¹⁵ Concur

¹⁶ Concur

¹⁷ And charts

¹⁸ Concur

¹⁹ Concur

²⁰ Concur with clarification. The uncharted wreck should be added to the AWOIS database. See section D.1.1 New Features

²¹ Concur

²² Concur

²³ Concur

²⁴ Concur

²⁵ Concur



APPENDIX I

Danger To Navigation Reports

There were no Danger to Navigation reports submitted for investigation in survey area H-11643. One uncharted wreck report was submitted, Appendix V, at the request of the Contracting Officers Technical Representative (COTR).



APPENDIX V

Supplemental Survey Records and Correspondence

Uncharted Wreck Report

Report of Uncharted Wreck

Sheet: A

Registry No.: H-11643

State: Alaska

General Locality: Unimak Pass

Sub locality: 5 NM North of Akun Island

Project Number: OPR-P188-KR-07

Survey Dates: June 4th, 2007 – In Progress

Depths are reduced to Mean Lower Low Water (MLLW) using predicted tides for Unalaska, Alaska (946-2620). Positions are based on the NAD83 horizontal datum.

This wreck does not pose a danger to navigation.

The wreck included in this report was determined to be uncharted by comparing the 2007 survey data to the largest scale chart(s) covering the survey area.

The NOAA Automated Wreck and Obstruction Information System (AWOIS) database was researched for wrecks in the vicinity of Unimak Pass, Alaska. No wrecks were reported for the vicinity covered by this report.

A review of the Minerals Management Service, Alaska OCS Region online database, resulted in the following information.

Vessel	Date of Wreck	Where Lost	Cause of Wreck	Destination	Length / Tons	Sources
Pan Nova	9/10/1983	40 miles NE of Dutch Harbor, AK, near Unimak Pass. Vessel sank 5 miles N of Akun Island	Collision with other freighter, took on water, sank	Pusan, Lorea	551'	Alaska Fisherman's Journal 10/83:9, Anchorage Times, Anchorage Daily News

Affected Nautical Charts:

Chart Number	Scale	Edition Number	Edition Date	Charted Horizontal Datum	Issued Date
16520	1:300,000	22	March 04	NAD83	March 04
16531	1:80,000	7	2/16/02	NAD83	2/16/02

ENC	Chart	Scale	Edition Number	Charted Horizontal Datum	Issue Date
US3AK61M	16520	1:300,000	3	WGS84	3/26/07

Comments:

Feature	Latitude (N)	Longitude (W)	Charted Depth (ft)	Sounding Depth (ft)	Difference (ft)
Wreck	54°22'45.54"N	165°38'24.23"W	294	245	49

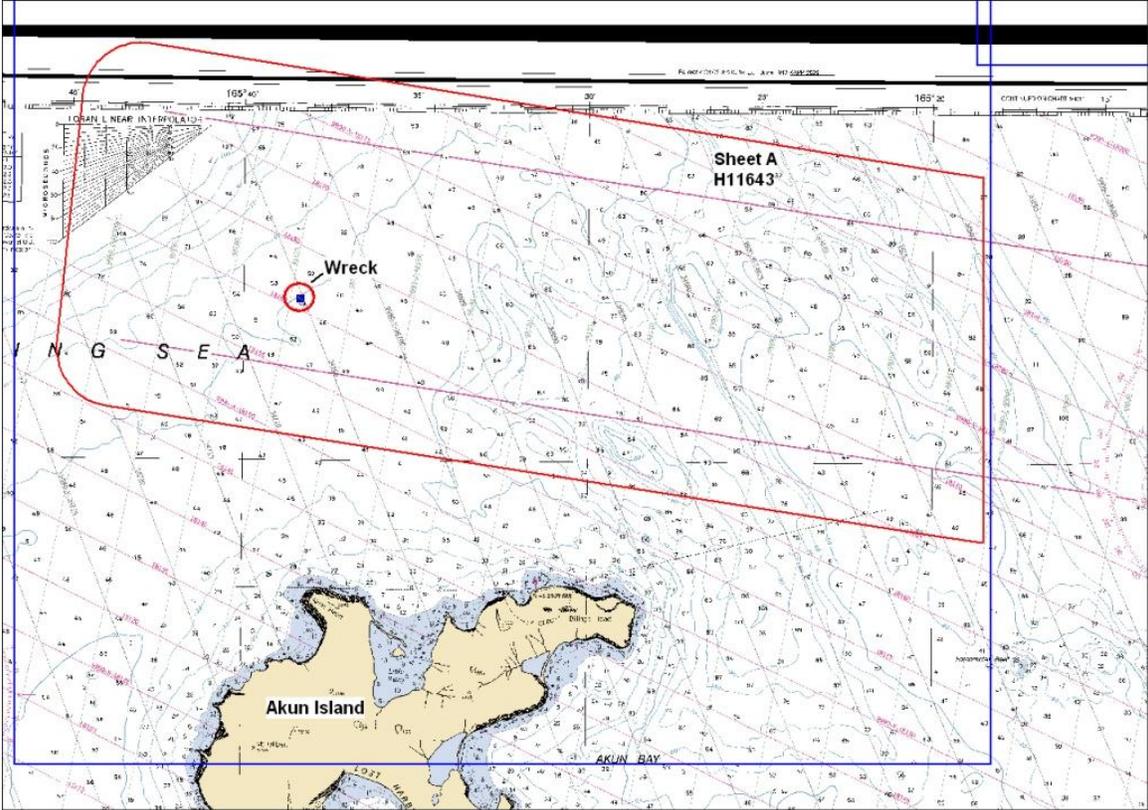


Figure 1: Overview of H-11643 showing wreck location, Chart 16531, 7th Edition (1:80,000 scale).



Figure 2: Image of Wreck, Chart 16531, 7th Edition (1:80,000 scale)

H11643 HCell Supplemental Report
Sarah Wolfskehl, Hydrographic Survey Intern
Pacific Hydrographic Branch

Introduction

The primary purpose of the HCell is to directly update NOAA ENC's with new survey information in International Hydrographic Organization (IHO) format S-57. HCell compilation of survey H11643 utilized Office of Coast Survey HCell Specifications Versions 2.0, with modifications as indicated in section 10.1, Data Processing Notes. HCell H11643 will be used to update chart 16531, 1:80,000 (7th Ed., February 16, 2002, NM 8/03/08) and ENC US4AK6FM (4th Ed., issue date 07/09/20).

1. Compilation Scale

Contours and the density of soundings are compiled as appropriate to emulate those of Chart 16531, 1:80,000. Position and density of features included in the HCell have not been generalized from the scale of the hydrographic survey, 1:20,000.

2. Soundings

2.1 Source Data

A 22 m resolution combined BASE surface, **H11643_Combined_22m.hns** was used as the basis for HCell production following Branch certification. This surface contained one designated sounding.

A survey-scale full density sounding (SOUNDG) feature object source layer was built from the **H11643_Combined_22m.hns** surface in CARIS BASE Editor. A shoal-biased selection was made at the 1:20,000 survey scale using a radius table with values shown in Table 1. The sounding feature object source layer was exported as H11643_SS.hob, and imported into HOM.

Upper Limit (m)	Lower Limit (m)	Radius (mm)
0	10	3
10	20	4
20	50	4.5
50	350	5

Table 1.

2.2 Sounding Feature Objects

In CARIS BASE Editor soundings were manually selected from the survey scale sounding set H11643_SS.hob to create a chart scale sounding set H11643_CS.hob. The H11643_CS.hob sounding selection emulates the density and distribution of soundings on chart 81071, while more closely representing the seafloor morphology. The soundings were selected with regard to a 50, 60, 70, 80, 90, 100, 200, and 300 fathom contour.

3. Depth Areas

3.1 Source Data

The finalized Base Surface, **H11643_Combined_22m.hns**, was used to generate a depth area, and for survey evaluation and verification purposes only, a set of contours. The contour set included the chart equivalent, 50, 60, 70, 80, 90, 100, 200, and 300 fathom contours. The depth contours were not submitted as deliverables, as according to OCS HCell Specifications ver. 2.0.

3.2 Depth Area Feature Objects

One all-encompassing depth range, 70 meters to 350 meters, was used for all depth area objects below MLLW. Upon conversion to NOAA charting units, this depth range is 38.3 to 191.4 fathoms.

4. Meta Areas

The following Meta object areas are included in HCell H11643:

M_QUAL
M_COVR

Meta area objects were constructed from filtered perimeter lines delineating the survey limits. The perimeter was first used to create the Skin of the Earth (SOTE) layer, then duplicated to the Meta object layers and attributed per the OCS HCell Specifications, Ver. 2.0.

5. Survey Features

The features for H11643 were delivered in .000 format and contain one wreck and 40 bottom samples.

6. Shoreline / Tide Delineation

No shoreline features or intertidal areas are included in H-Cell H11643.

7. Attribution

All S-57 Feature Objects have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with OCS HCell Specifications ver. 2.0.

8. Layout

8.1 CARIS HOM Layering Scheme

20	Bottom Samples
100	Survey Scale Soundings
101	Chart Scale Soundings
200	Depth Area/Skin of the Earth
300	Wreck
600	M_covr
601	M_qual
800	Blue Notes (spatial only)
1001	Contours (spatial only)

8.2 Blue Notes

Notes regarding HCell feature compilation are on layer 800 and as shape file sets **H11643_bluenotes_p.shp** and **H11643_bluenotes_l.shp** for point and line figures, respectively. A copy of the survey perimeter is included in the line shape file set for orientation purposes.

9. Spatial Framework

9.1 Coordinate System

All spatial map and base cell file deliverables are in an LLDG geographic coordinate system, with WGS84 horizontal, MHW vertical, and MLLW (1983-2001 NTDE) sounding datums.

9.2 Horizontal and Vertical Units

During creation of sounding sets and contours, and creation of the HCell, units are maintained as metric with millimeter resolution. NOAA rounding is applied at the same time that conversion to chart units is made to the metric HCell base cell file, at the end of the HCell compilation process.

The CARIS environment variable, `uslXsounding_round`, controls the depth at which rounding occurs. Setting this variable to NOAA fathoms and feet displays all soundings equal to or greater than 11 fathoms as whole units. Depths shoaler than 11 fathoms are shown in fathoms and feet.

In an ENC viewer fathoms and feet display in the format X.YZZZ, where X is fathoms, Y is feet, and ZZZ is decimals of the foot. For fathoms and feet between 0 and 10 fathoms 4.5 feet (10.75 fms), soundings round to the deeper foot if the decimals of the foot are X.Y75000 or greater. For fathoms and feet deeper or equal to 11 fathoms, soundings round to the deeper fathom if feet and decimals of the foot are X.45000 (X.Y75000) or greater. In an ENC viewer, heights greater than 6 feet will register in fathoms and feet using the above stated rules. Drying heights are in feet and are rounded using arithmetic methods.

HOM Units

Sounding Units:	Meters rounded to the nearest millimeter
Spot Height Units:	Meters rounded to the nearest meter

Chart Unit Base Cell Units

Depth Units (DUNI):	Fathoms and feet
Height Units (HUNI):	Feet
Positional Units (PUNI):	Meters

10. QA/QC

10.1 Data Processing Notes

Manual chart scale sounding selections were made for this survey.

A small, northwest section of survey H11369 falls outside the borders of chart 16531. The data from this area of the survey should be used to update the smaller scale chart of the area, 16520, 1:300,000 (22nd Ed., March 1, 2004, NM 8/03/08) and ENC US3AK61M (4th Ed., issue date 08/03/03).

Per agreement with MCD, and in anticipation of OCS HCell Specifications ver 3.0, certain ver 2.0 requirements have been altered or not met. Deviations from the ver 2.0 Specifications are as follow:

- The M_NSYS meta area object has been eliminated from the HCell.
- The term “surve” used to populate the source section of the SORIND attribute has been changed to “survy” for all features and meta objects.
- The naming convention for the chart scale based file was changed from US411643_CU.000 to US411643_CS.000.

10.2 ENC Validation Checks

H11643 was subjected to QA and Validation checks in HOM prior to exporting to the HCell base cell (000) file. Full millimeter precision was retained in the export of the metric S-57 base cell data set. This data set was then converted to a chart unit 000 file. dKart Inspector 5.0 (Service Pack 1) was then used to further check the data set for conformity to the S-58 version 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and errors investigated and corrected where necessary.

11. Products

11.1 MCD Deliverables

- H11643 Base Cell File, Chart Units, Soundings compiled to 1:20,000
- H11643 Base Cell File, Chart Units, Soundings compiled to 1:5,000
- H11643 Descriptive Report including end notes compiled during office processing and certification
- H11643 HCell Supplemental Report

- H11643 Data Acquisition and Processing Report
- Blue Notes shape files
- .000 Features File

11.2 File Naming Conventions

HOM file set prefix: *H11643_hc.**

MCD Chart units base cell file: *US411643_CS.000*

MCD Chart units base cell file, survey scale soundings: *US411643_SS.000*

Features File (for CGTP): *H11643_Features.000*

11.3 Software

HIPS 6.1:	Management and inspection of Combined BASE surfaces; generation of the BAG
BASE Editor 2.1:	Combination of Product Surfaces and initial creation of the S-57 bathymetry-derived features, examination of base cell files against the chart; chart density sounding selection
HOM 3.3:	Assembly of the HCell, S-57 products, QA
GIS 4.4a:	Setting the sounding rounding variable
Pydro v7.3 (r2014_TCfix)	Creation of AWOIS and DTON reports; export of features for the HCell
dKart Inspector 5.0:	S-58 Validation of the HCell base cell file

12. Contacts

Inquiries regarding this HCell content or construction should be directed to:
 Sarah Wolfskehl, Hydrographic Survey Intern, PHB, Seattle, WA; 206-526-6859
 Sarah.Wolfskehl@noaa.gov.

APPROVAL SHEET
H11643

Initial Approvals:

The survey evaluation and verification has been conducted according to branch processing procedures and the H-Cell compiled per the latest OCS H-Cell Specifications.

The survey and associated records have been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, S-57 classification and attribution of soundings and features, cartographic characterization, and verification or disproval of charted data within the survey limits. The survey records and digital data comply with OCS requirements except where noted in the Descriptive Report and are adequate to supersede prior surveys and nautical charts in the common area.

I have reviewed the H-Cell, accompanying data, and reports. This survey and accompanying digital data meet or exceed OCS requirements and standards for products in support of nautical charting except where noted in the Descriptive Report.